Black River Bridge
Spanning the Black River
on Town Highway 36 approximately
0.3 miles northwest of the interesction of
Town Highway 36 and Town Highway 7
Coventry
Orleans County
Vermont

HAER No. VT-19

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
MID-ATLANTIC REGION, NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR
PHILADELPHIA, PENNSYLVANIA 19106

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HISTORIC AMERICAN ENGINEERING RECORD
BLACK RIVER BRIDGE

HAER No. VT- 19

Location: Spanning the Black River on Town Highway 36 approximately 0.3 miles northwest of the intersection of Town Highway 36 and Town Highway 7.
Town of Coventry
Orleans County
Vermont

USGS Irasburg Quadrangle, Universal Transverse Mercator Coordinates 18.715600.4971785

Date of Construction: 1905

Engineer: United Construction Company/American Bridge Company

Present Owner: Town of Coventry
Coventry, Vermont

Present Use: Vehicular Bridge

Significance: This bridge is significant as a representative example of the bridges constructed in the early 20th century. By the turn of the century with bridge design becoming standardized, the Warren and the Pratt trusses, with riveted construction, were widely used, replacing the variety of designs used in the 19th centruy. This bridge, with its extremely light members and narrow width, is typical of the town highway bridges constructed before the advent of substantial motor vehicle usage. This truss is also notable for its railing, a decorative holdover from the 19th century superceded by plainer pipe and angle railings soon after 1900. This bridge is eligible for inclusion in the National Register of Historic Places.

Project Information: This documentation was undertaken in September of 1990, in accordance with a Memorandum of Agreement signed by the Federal Highway Administration (FHWA), the Vermont State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservatioon (ACHP). The Memorandum of Agreement has been accepted by the ACHP as a mitigative measure prior to the removal of the bridge in 1990.

Prepared by Sivanuja S. Sundaram, Civil Engineer, Location & Environmental Studies Section, Vermont Agency of Transportation, Montpelier, Vermont.

1. Site Features and Historical Background

This bridge is located over the Black River in the Southwestern part of the Town of Coventry, Vermont. There is a dam just downstream with a USGS gauging station. The Black River branches approximately 25 miles south of Coventry such that there are multiple headwaters including, but not limited to, Lake Elligo and the Greater Hosmer Pond - Little Hosmer Pond - Hartwell Pond complex near Craftsbury. From Coventry, the Black River flows northeast and empties into Lake Memphremagog. Lake Memphremagog drains via the Magog River into the St. Lawrence River in Quebec which turns east to the Gulf of St. Lawrence and the Atlantic Ocean (Ref. 1).

Coventry is located in the north central part of Orleans County, with an area of 18,176 acres (Ref. 2) The Town of Coventry is bounded by Newport on the northwest, Derby on the northeast, Brownington on the southeast and Irasburg on the southwest. The town is rather hilly in the western and southeastern parts with gentler slopes in the central part. The town is located at an elevation of less than 1,000 feet. (Ref. 3).

Like most Vermont towns, Coventry was established by land grants by the State of Vermont. Coventry was granted by the State of Vermont to Major Buel of Coventry, Massachusetts and 59 other men in 1780. At that time, Orleans County was destitute of inhabitants and inaccessible by roads. The lands were of no value except for speculative purposes. Later Buel purchased the rights for the lands from the others, but most of the lands were sold to Ira Allen in 1791 to satisfy some tax claims. In 1799, Jabez Fitch of Vergennes bought the lands. (Ref. 3, 4, 5).

The first settlers came to Coventry in the year 1800. The first settlers - Samuel Cobb and his son Tisdale made a pitch in the eastern part of the town. Their families and neighbors from Westmoreland, New Hampshire followed later. Fitch encouraged the immigration of settlers from Addison County by selling them lands at moderate prices. These settlers from Addison County settled in the western part of the town. (Ref. 3, 4, 5)

The Town of Coventry was organized at a town meeting and the officials elected in 1803. The first public road was built in 1805. The general direction of the road was north to south. The first east to west road was built in 1806 and it crossed Barton River with the first bridge built in Coventry. The first railroad was laid in 1863 by the Connecticut-Passumpsic Railroad. The town meetings were held in the Academy Building from 1838-1915. The building was destroyed by fire in 1915 and the town records including those of the Road Commissions prior to 1914 were destroyed. (Ref. 3, 4, 5)

The first sawmill was built in 1801. By 1823, the Town of Coventry had 3 sawmills, 1 gristmill and 1 fueling mill and by 1840

the town had 2 sawmills, 1 gristmill, 1 clothiery work, 1 tannery and 1 starch factory. The first school house was built in 1823. By 1882 there were 2 churches, 1 post office, 1 hotel, 2 stores, 1 tannery, 1 sawmill, 2 blacksmiths, 1 harness shop, 1 shoe shop and 10 schools in Coventry. Black River and Barton River flowed in the north direction to empty into Lake Memphremagog. Since the land around these rivers were swampy and not fit for cultivation, the Town of Coventry was largely devoted to intensive dairy farming. The milk was sold to suppliers to Boston Market. (Ref. 3, 4, 5)

2. Bridge Description

The bridge is a single span steel Warren pony truss. The 68-foot span is composed of five 13'-6" panels. Each panel is detailed as follows: (Ref. 6)

The top chords are 3" x 4" channel girders. The bottom chords consist of paired angles, except on end panels which are joined by stay plates on the bottom about 40" apart. The first and third diagonals are composed of paired angles. The other diagonals and verticals consist of paired angles connected by lattice bars. All of the connections are riveted. (Ref. 6)

The floor system is composed of I-section floor beams and stringers, with tie-rod cross-bracing. The bridge has a new asphalt corrugated floor. The bridge rail consists of 15" wide lattice railings with rosettes at intersections. Some parts of the railing are missing. The west abutment consists of rubble and the east abutment has concrete poured over rubble. (Ref. 6)

Since it s construction in 1905, the bridge has been repaired. In 1965, the bridge stringers were replaced. The bridge is presently closed to all traffic due to its structural inadequacies. The structure is on a downgrade with sharp corner into abutment. There is a section of rail missing at the left end of abutment. The posts and rails are badly bent. There are numerous cracks, mostly transverse, on the bridge floor. There are small sections where the asphalt is broken up and there is a slotted hole near the centerline near one of the abutments. The upper truss members have some rust overall. Both sections of angle iron in the bottom chords have been replaced at all four corners. Many of the sledge bolts from the bolted bearing plates in the corners are missing. There is heavy rust scale and section loss in the truss members and floor beams. There are s few voids in the laid-up stone along the base of the abutments and the concrete abutment has deep spalling along the bottom. (Ref. 7)

3. Construction

In late March and early April of 1905, there was an unusually warm spell which resulted in an early thaw. There was a high volume

of water in the river. The apron of the dam went out and the cakes of ice coming over the river injured the Black River Bridge in Coventry making it impassable. The Black River Bridge was one of two bridges that had to be replaced. At the town meeting held in April 1905, the Town of Coventry decided to erect two replacement steel bridges. The town accepted the $2000 state appropriation for highway and bridges. The Black River Bridge was removed and a temporary bridge was built in May 1905. At the same time, the town purchased the two replacement steel bridges from the United Construction Company of Albany, NY. In July 1905, the steel bridges were erected. (Ref. 8)

Even though the contract was given to the United Construction, the bridges were fabricated by the American Bridge Company of NY. The American Bridge Company was the country's largest fabricator of steel bridges and a major supplier of Vermont bridges upon its formation in 1900. The United Construction Company won many contracts in Vermont, always on bridges fabricated by American Bridge. This lucrative cooperation for the most part ended after American Bridge Company reorganized in 1914. (Ref. 6)

4. Design and Technology

The changes in the bridge-fabricating industry in the late 19th century had begun to narrow the variety in types of trusses used before that period. Some notable disasters had made the companies and their designers more conservative in the face of an enraged public. The well-proven patterns like the Pratt, Warren and their variants gained an insurmountable edge. The Warren pony truss used in this bridge set a good example for the standardized bridges built later in the century. One example of a standardized bridge with a Warren pony truss design is the River Road bridge in Troy. (HAER No. VT-15))(Ref. 9)

The relatively simple joints of the Warren pony truss permitted engineers to determine how load was distributed in them, and to design with the assurance that any failure would come from the members and not at a joint. Since the use of motor vehicles was not significantly great at the turn of the century, the truss members of this bridge were lighter than the truss members of the bridges built later in the century. The industry adopted steel as the favored material since the common structural shapes like angles, plates, and channels were available in steel at reasonable prices. Late in the nineteenth century, the engineers realized the advantage of pneumatic field riveting due to the superior rigidity of riveted connections. Riveting became standard after pneumatic field riveting became a standard process. (Ref. 9)

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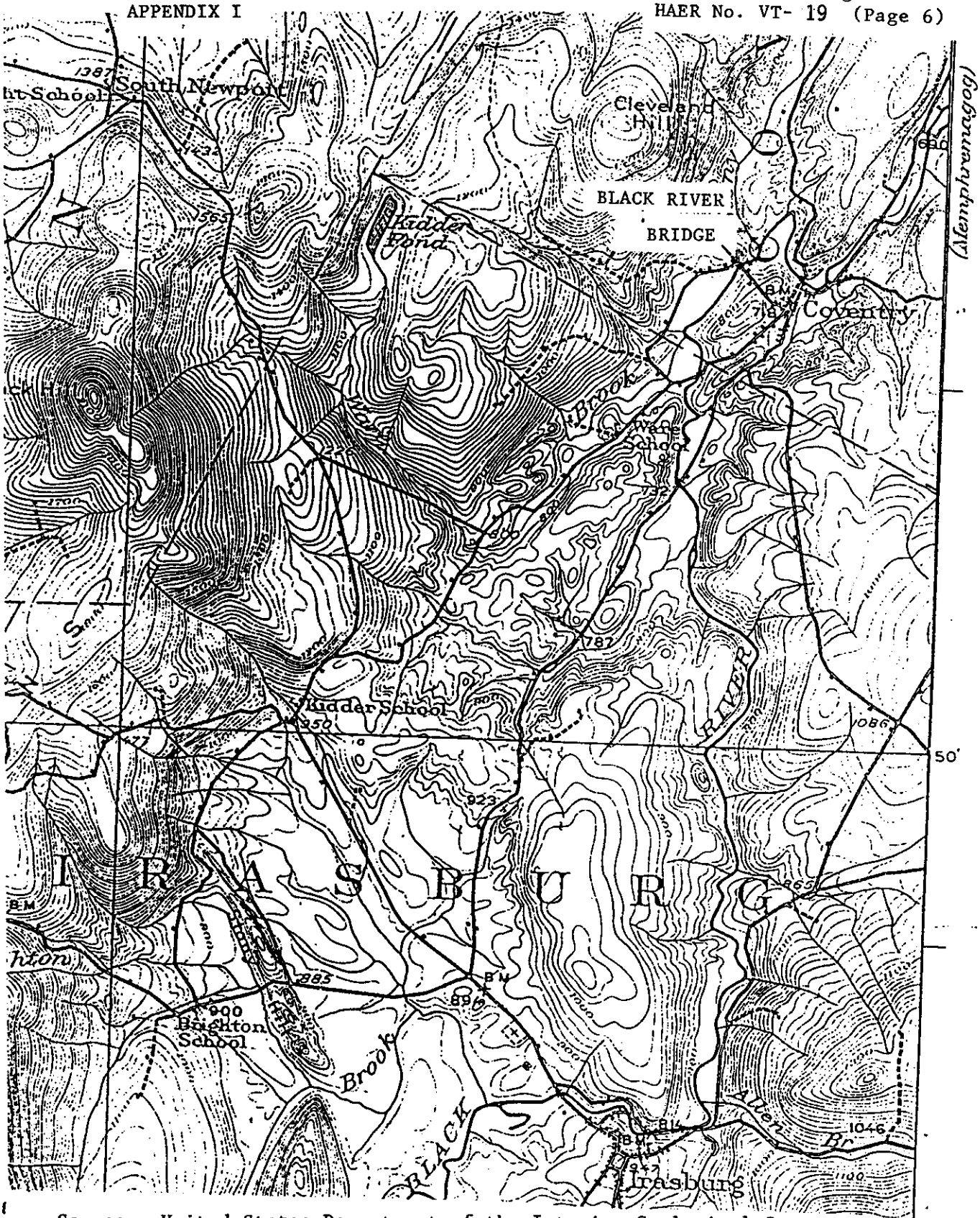
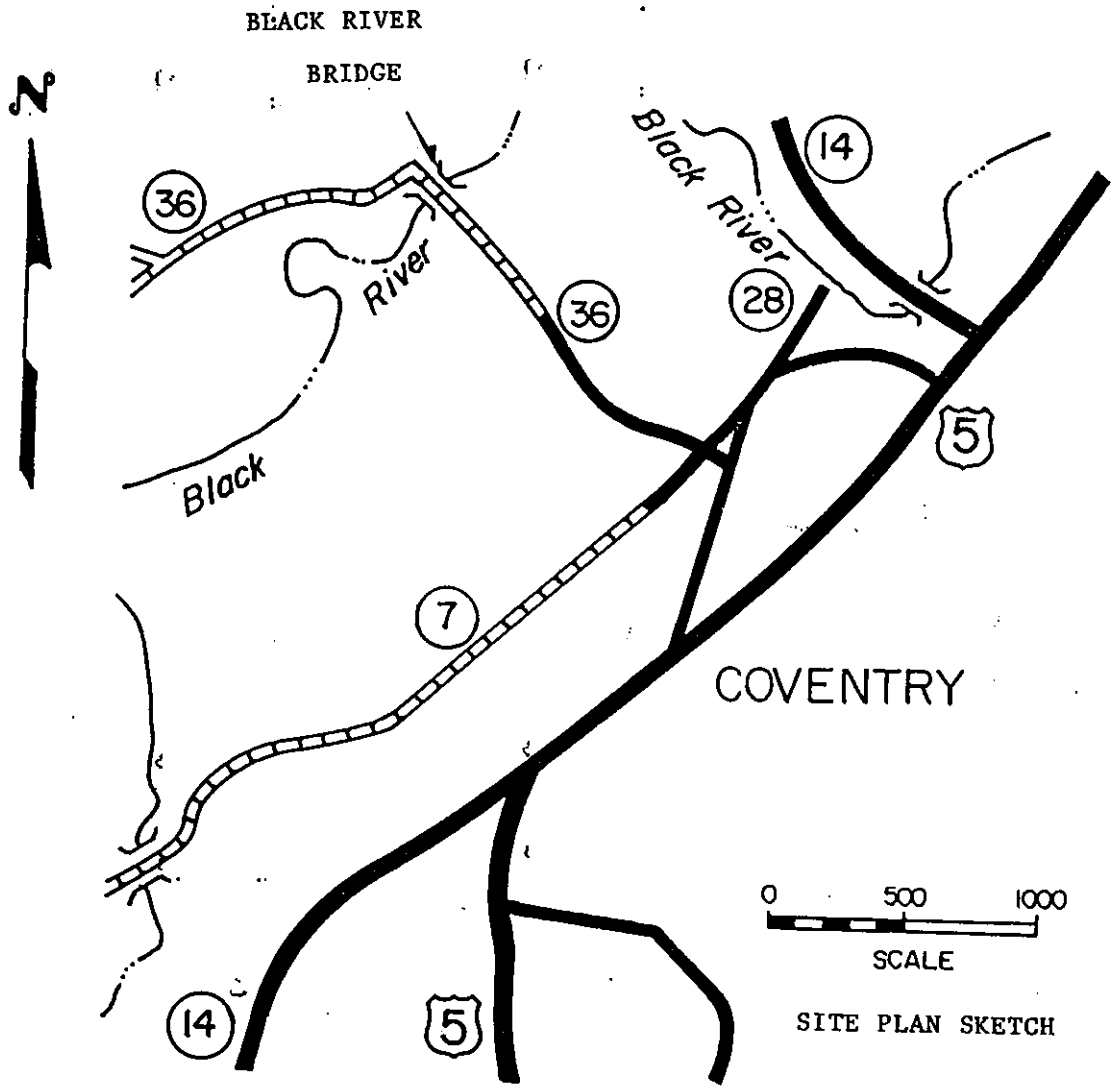
7. Town Bridge Inspection Report, Bridge 20, Coventry, Bridge Division, Vermont Agency of Transportation, Montpelier, August 5, 1988.

8. Orleans County Monitor, March - July 1905.

9. Roth, Mathew, and Clouette, Bruce, Vermont Historic Bridge Survey, Final Report and Preservation Plan, Division for Historic Preservation, Agency of Development and Community Affairs, State of Vermont, 1985.



Source: United States Department of the Interior Geological Survey, Irasburg Quadrangle, Geological Survey 1937.



Source: Vermont General Highway Map, Town of Coventry, prepared by Vermont Agency of Transportation, Planning Division in cooperation with the U.S. Department of Transportation Federal Highway Administration, 1986.

BLACK RIVER BRIDGE

COVENTRY

Perpendicular Distance between centerlines of top chords of the two trusses = 18'-2"

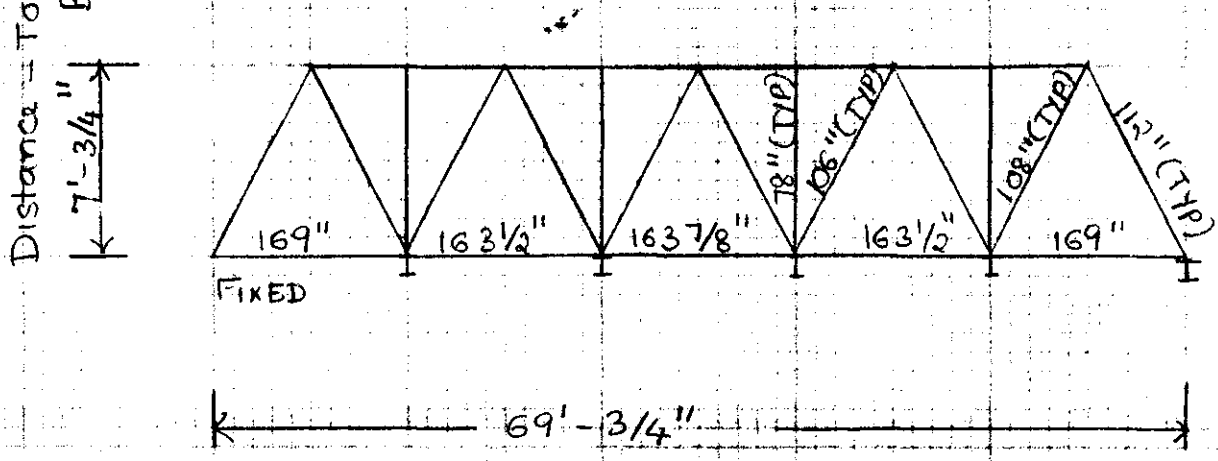
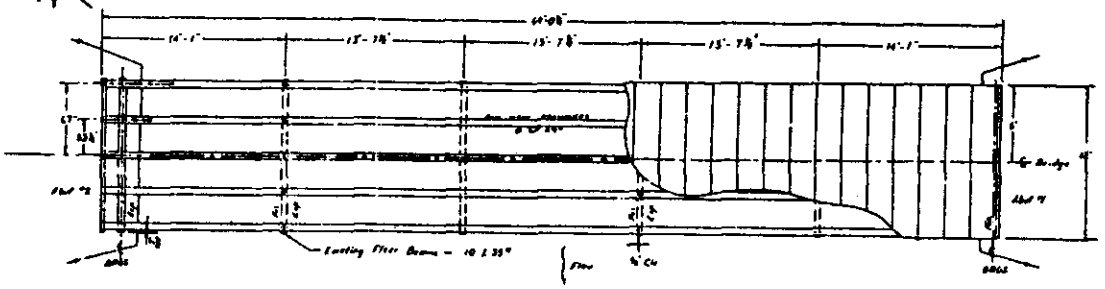


PLATE DATA: 1905

AMERICAN BRIDGE CO. OF NY
(CARNEGIE)

Black River Bridge
HAER No. VT-19 (Page 9)



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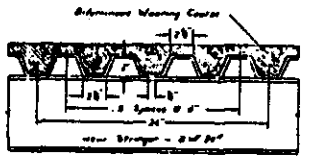
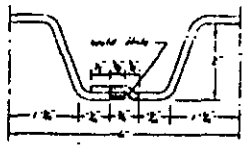
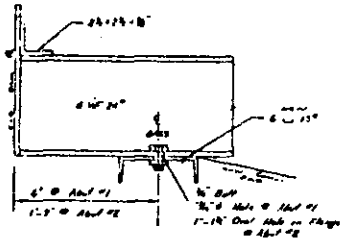




DECK PLATE DETAILS



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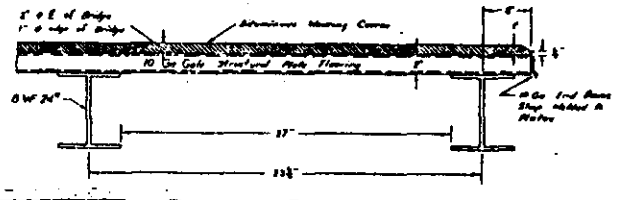
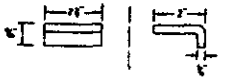
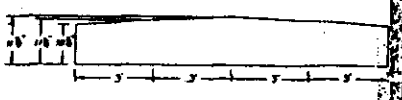
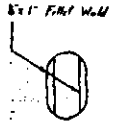


PARTIAL SECTION







YIELD DETAIL

Appendix III

ITEM	UNIT	QTY	TOTAL
CONC. EXCAV. OF SLOPE	C.Y.		
CONC. EXCAV. OF BASE	C.Y.		
UNCLASS. STRM. EXCAV.	C.Y.		
STRUCT. EXCAV.	C.Y.		
CONC. CLASS AA (WOOD)	C.Y.		
CONC. CLASS B (DECK)	C.Y.		
REINF. STEEL	LBS		
BITUMINOUS MIX. (PATCHING)	S.Y.		
DRIVEN TIMBER PILING	L.F.		
SPLICED TIMBER PILING	EA.		
STEEL PILING	L.F.		
BITUMINOUS TIMBER PILING	L.F.		
A.C. 3 COURSE BRIDGE STRUCT.	SQ.YD.	1013	1013
SURF. TREATMENT (BITUMINOUS CONC.)	SQ.YD.		
STEEL BRIDGE RAILING (MODIFIED)	LF.	1	1

STATE OF VERMONT
DEPARTMENT OF HIGHWAYS

TOWN OF COVENTRY
ROAD NO. 36 BRIDGE NO. 20
10 GA. GALV. STRUCTURAL PLATE FLOOR DETAILS
SCALE AS NOTED
SURVEYED BY J.A.B.
DRAWN BY F.J.F. CHECKED BY J.A.B.
PROJECT NO. 17-6146
SHEET 1 OF 1

DESIGNED [illegible] APPROVED [illegible]
DRAWN RHC APPROVED [illegible]
DATE Sept. 23, 1982 DATE Oct. 12, 1982 DATE Oct. 12, 1982